

THE <sup>K</sup> ENGLAND. - COMMITTEE OF  
LANDOWNERS, ETC.

# R E P O R T

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(14)

J A M E S G O L B O R N E,

O F T H E

C I T Y of E L Y,

E N G I N E E R;

In pursuance of several Resolutions passed at a Meeting of the Committee of Land Owners, and others, Interested in the Improvement of the Outfall of the *River Ouse*, at the CROWN and ANCHOR, in the *Strand*, on Thursday the 16th of *June*, 1791; And Read before the same Committee, at the ROSE TAVERN, in *Cambridge*, on Wednesday the 31st. of *August*, in the same Year; and which is now Printed by Order of the said Committee.

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L Y N N:

Printed by W. WHITTINGHAM, 1791.

THE  
 REPORT  
 OF THE  
 COMMISSIONERS  
 OF THE  
 LAND OFFICE  
 IN  
 RESPONSE TO A RESOLUTION  
 OF THE HOUSE OF COMMONS  
 PASSED IN 1845

In pursuance of a Resolution of the House of Commons, passed on the 12th of June 1845, the Commissioners of the Land Office have the honor to lay before the House the following Report, which is now printed by Order of the House of Commons.



Printed by W. Woodman, 1846.

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THE  
REPORT, &c.

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At a Meeting of the Committee of Land Owners,  
and others interested in the improvement of the  
Outfall of the River *Ouse*, (appointed by the  
Country) at the *Crown and Anchor*, in the  
STRAND, on Thursday the 16th. of June, 1791.

HENRY BELL, Esq. in the Chair.

THE proceedings and resolutions of the meeting at  
*Ely*, on the 20th. of May last, the resolutions of the  
corporation of the *Bedford Level*, of the 15th of June  
instant, and Sir CHARLES GOULD's letters to the chair-  
man, having been now read,

RESOLVED



## RESOLVED,

" That an estimate of every expence attending the making the proposed new cut from below *St. German's* bridge near *Eau-brink* to the port of *Lynn*, (including the value of the lands to be cut through,) be immediately prepared.

" That *Mr. JOHN SMEATON*, *Mr. JAMES GOLBORNE* and *Mr. JOHN WATTE*, be, and they are hereby, employed to make such estimate.

" That the said engineers, in making their estimates shall take into consideration, any bridge or bridges, necessary to be made over the said cut, and any sluices or drains necessary to bring the waters of *Marshland* into the said cut; and make separate estimates of the expence of each work, for the consideration of the committee.

" That the said engineers shall make estimates separately, and report their several opinions, as to the advantages, or injuries,



injuries, which will attend the making of the said cut, as to drainage and navigation. "

In pursuance of, and in obedience to the above resolutions, in the month of July, which was as early as with my other engagements of business I could, I repaired to the place where this work is proposed to be carried on, and proceeded to make such observations and enquiries, as with my own knowledge of the place, and the drainage, and navigation to be affected by it, before obtained, during my long exercise, of superintendant of the works of the honorable corporation of the *Bedford Level*, might enable me to answer the ends of the committee : by the enquiry and reference directed, both as to what may be the operation, and consequences of the proposed cut, from *Eau-Brink*, to a certain place near *King's Lynn*, as also, what will be the expenditure necessary for the execution of the same, and in the making such observations and enquiries, I proceeded as follows :

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I measured the different lengths of the proposed new cut, as also such parts of the old river, as I thought necessary for the purpose. I took the different soundings of the present channel, at different times of the tides, from *Eau-Brink* down to, and through *Lynn* harbour, as also from *Eau-Brink*, up to *Denver* sluice; I measured the width of the channel, between *Eau-Brink* and *Denver* sluice, as well where it was confined, as where it was too much expanded; I bored down in different places of the ground, through which it is proposed, that the new cut should be dug, to discover the different strata of earth, which such grounds would produce, for the formation of banks, that are to confine the waters, that must run through the same within proper bounds, as also to defend the adjoining lands from inundations of the sea; I attended to, and made observations on the flowing of the tides at *Lynn*, *St. German's* bridge, *Stow* bridge, and *Denver* sluice, in one and the same tide; and these observations I repeated, as often as it seemed necessary.

From

From these materials, and assisted by others, which I collected in the year 1777, I can form but one opinion, which is, that if such a cut should be carried into execution, it would be of more benefit to the middle and fourth levels, and also to all other low grounds discharging their waters into the river *Ouse*, in any part of it above the harbour of *King's-Lynn*, than any work that hath ever been yet executed for the purpose of drainage.

By the levels, taken and published by Mr. WATTE, it appears that low-water mark would, by such cut being made, be lowered four feet nine inches at *St. German's* bridge. Similar levels were taken by Mr. WHITWORTH in 1777, who makes the same fall. This furnishes ample proof of the correctness with which these levels so taken and stated by different engineers at different times, without any communication with each other, were at those different times taken.

For



For the sake of round numbers, I will take it, that only four feet fall will be gained by the proposed cut, though I have not a doubt of its being lowered so much more than four feet, as both the levels are taken at. The gaining of one foot fall, to a district of a few thousand acres, demands great attention, from the drainer of low lands; if that is the case, what attention, and what support should not be given, and held out, in favor of a proposal, which in all probability, will lower the surface of the water four feet, throughout a tract of land, containing three hundred thousand acres? a considerable quantity of which, by a proper cultivation, hath of late years shewn in some degree its value, and the farther improvement of which, hath only been prevented by the want of a better drainage; to which cause it is owing, that the proprietors and occupiers have been prevented from enriching themselves, by such means as from their industry they are intitled to.

That no public work of so great a magnitude, can be carried into execution, without the interfering with  
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the private interests of some few individuals, must be generally acknowledged, for experience hath long and often shewn it, but this work seems to hold out as fair a prospect as any of so great an extant can, of doing as little private injury as may be, and will at the same time distribute its favours impartially, with the hand of kindness to many worthy proprietors, and industrious occupiers of Fen Lands.

To an unprejudiced, and disinterested person, I presume, that the great advantages to arise from the proposed cut is, because it must be apparent. Different opinions may, and without doubt will arise, as to the mode of raising the fund which will be necessary for defraying the expence of its execution ; but, I cannot be inclined otherwise than to believe, that there can be but one opinion, with respect to the general advantages to be derived from the work itself.

Many may, and have without doubt, misconceived the benefits that may accrue to the public, from such an un-

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dertaking, or they may have been misinformed as to its general tendency; to such, I beg leave to recommend an inspection of the present, as well as of the proposed channel; and if they are friends to, and interest themselves, either in the drainage of the country, above the port of *Lynn*, (particularly the drainage of the middle and south parts of the *Great Level*,) or to the navigation passing through the same, to the several adjoining highland counties, they will be advocates for the proposal; as an inspection only, seems requisite, to convince every reasonable, disinterested, and unprejudiced person, of the great advantages that will arise from it, to both.

As it is customary in the improvement of any river, to begin at the lower end, and by steps advance gradually upwards, until the improvers arrive at its head, in such order shall I endeavour to give my opinion, I shall begin at the lower end, or at *Lynn*, and ascend by degrees, up the river towards *Cambridge*, or as far as the sluice at *Clayhithe*.

With



With respect to the effect, that the proposed new cut may have on the harbour of *King's Lynn*; I think it almost unnecessary to observe, that in which I presume, every man of science, or experience will agree; that in the deepening, improving, or preserving of any river, or harbour, the first object to be attended to, for the obtaining of those ends effectually, should be the collecting together in such a part of such river or harbour, as may be deemed the most convenient and proper for such purpose, every reflowing channel or stream, that can with convenience, and at any moderate expence be collected together, and this more particularly so, when such channels or streams, can be brought to act, in conjunction at the last quarter's ebb, on such river, or in such harbour.

That the river, or harbour opposite to *Lynn*, is in a much worse state, than it was in the summer 1777, when my uncle (Mr. JOHN GOLBORNE, of *Chester*, the late Mr. WING of *Thorney Abbey*, and myself surveyed it, is evident from the soundings, and observations made at that time, being compared with the soundings and observations, taken in my late view of it, and that a principal part of the defects in that harbour, having increased since  
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that time, by the ill-directed course, in which the waters from the country above, have discharged themselves into that part of the channel, and this mischief increased by the great expansion of the river above it, are facts that I am warranted to believe will not, cannot be denied: If such are the mischiefs, what must be the remedy applied to them at present, and how are they to be prevented in future?

It is my duty in this employment,—I will answer these questions. In order to accomplish the above desirable ends it will be necessary, as an introduction to any further improvements, first, to confine the channel above *Lynn*, to a proper breadth, to collect together all the reflowing waters, that can be collected together conveniently, and to cause such waters to fall into *Lynn* harbour, by a confined, and well directed channel, of a proper breadth; a channel, that shall be capable of maintaining a proper depth of water, both for navigation and drainage; and a channel, that shall constantly discharge at the last quarter's ebb, a sufficient quantity of reflowing water, to  
prevent

prevent an accumulation of filt, &c. from subfiding in the harbour or river. This answer contains an opinion I never can depart from.

If any fimilar works fhould be thought neceffary for the improvement of that harbour, I ask, whether all fuch works will not be perfectly answered by the propofed new cut? affuredly they moft certainly will, and in all probability, to a much greater degree, than may be generally imagined, even by thofe who are now the moft fanguine in their expectations.

The bringing down an additional column of water, in one confined, and well directed channel, under the protection of well formed Banks, fituated at proper diftances, and compofed principally of the beft materials that nature can beftow, for the purpofe of refifting the violence of tempeftuous winds and tides, with proper forelands between fuch Banks, and the river, and that column of water, being not lefs than five feet deep, and thirty miles in length, and defcending in the laft quarter's ebb, (when the current in  
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the channel is quite languid and nearly stagnant in many parts, owing to the inequality of the depth of such channel; by which all its power of grinding down the bottom at the parts most required, is feeble, and nearly lost) such a column of water so directed and acting, cannot fail of operating in a degree highly advantageous to the navigation above *Lynn*, highly advantageous to the general drainage of all the country above that port, and particularly advantageous to the port and harbour itself.

For it is a well known fact, that a brisk current, at the latter end of the ebb, is more effective in grinding down, and maintaining a good and deep channel, than it is at every other part of the ebb besides; because, it then by being reduced within certain bounds will operate more forcibly, and may (if required) be assisted more easily, and its effects act, and be felt more powerfully, than in its present state is possible to be.

It may be necessary to observe, that, in the proposed new cut it is intended, to have two angles or curves, one at the  
upper

upper end immediately below *Eau brink*, to bring the said cut, in a proper direction through those marshes, and at the lower end, to lead the waters out of the said cut, in a fair direction into *Lynn* harbour. On the upper angle or curve I presume, any observation is needless, as it is not in such a situation, to make any little alteration of it, (if required) very material to any one; and as to the lower angle or curve above *Lynn*, as the expence of executing the works, will be nearly the same, such angle or curve may be brought down to such a direction as to discharge itself at such a point as the *Lynn* Merchants approve of; either against the Ball, against that part of the river where the Ball-fleet commonly lye, against the tier of buoys to the offing of that part of the channel, or against any one point, between the Ball and *Old Lynn*, which they may conceive to be best calculated for to improve, and to keep open the channel or harbour; but in my opinion a point between the Ball-fleet and the tier of buoys, or some point near that, may not be an improper direction, for such channel to discharge itself by, into their harbour. This is matter of opinion, it must finally be left to the examination

examination and judgment of the Merchants of that port, or to such as they may appoint to act for them; and have only to observe, that by adopting either of those directions, every purpose required, both for the navigation, and drainage of the country above *Lynn* harbour, will be answered.

With respect to the navigation above *Lynn*, I presume, that, it would be an insult, to any person's understanding, to inform him, that by the proposed new cut, parallel to which, there will be good banks, and good forelands to hale upon, the gangs of lighters may, at all times navigate, either up or down, with much more expedition, and with infinitely much less danger, than they now do, along the present, wide, difficult, and uncertain channel from *Eau-Brink* to *Lynn*. For there were when I view'd it, in some parts two, in others three, and about half a mile above *Lynn*, four different channels, with sand banks between each channel, considerably above low water; and I was informed, that these channels are so frequently shifting, as to make it very often impossible to go down with an empty gang at low water, and very frequently so changeable,

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as to deceive the bridge pilots, who pilot the gangs up to *Germans* bridge, or higher up the river, and who though they have daily experience in navigating the gangs of lighters up and down that river, are not always able from the sudden alterations of such channels, to conduct up with safety those gangs, that they are put on board of, as pilots to carry up the river, for that they often run aground in their passage.

The risque that the gangs at present run by hazarding their cargoes, especially when they are valuable, through so wide and so dangerous a passage, at all times dangerous, but especially so in tempestuous weather, will by this proposed cut be avoided.—The expence of bridge pilots be saved;—The wear and tear of the craft will thereby be lessened, the labour of the men, boys, and horses lessened, the voyages be performed with greater certainty, and in a much less time than they are at present.—These and many more, will be the advantages that the navigators will receive, if this cut should be made.

The proprietors, and occupiers of the lands, on each side of the proposed new cut, together with every person interested in the event, may rest with security, and not be under the least apprehension, for the safety of such new erected banks, when they shall hereby be informed, that upwards of four fifths of such banks will be made of a strong clay, or a gault, and that the dimensions of such banks are proposed to be, not less than sixteen feet in perpendicular height, above the level of the marsh from *Eau-brink*, down to the first cross bank (which distance is about eleven furlongs,) and not less than thirty feet wide at the top, with a proper batter or slope on each side of such banks; and from that cross bank, down to the lower end, a little above *Lynn*, the bank will be of the same height from the level of the marsh, and not less than sixty feet wide at the top, in the narrowest part of such bank, and from that width, to seventy feet wide and upwards, with a proper batter or slope on each side of such banks.

There is another circumstance to be noticed, which will be considerably in favor of such land owners, which  
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is, that in a little time after the compleating of such cut, they will be exonerated from a very heavy expence, which they now are, and must be liable to, for the maintenance and support of their sea banks, and counter shores, the expence of which I do not pretend to estimate, but refer it to the recollection of those who are concerned in the immediate payments of works done for the preservation of such banks, and of such counter shores.

From the materials which the marshes are formed of, through which it is proposed to carry such a cut, being composed chiefly of a strong clay, or a gault, it will be necessary to make the said cut, to the full dimensions that it shall be ever intended to be made at any time. This will cause the expence to be much greater, than if it was cut through materials of a softer nature, which might by the assistance of machines in proper times, and in times of land floods descending down it, be improved, widened and deepened to a greater degree, than it can now by those means be done. But even the nature of the soil will have its good effects; for if it is so hard as to resist the effects of mechanical art, in its attempt to make it at a less expence,



expencc, than what arises from spade work, it must be proportionably well calculated, to resist the violence of wind and water, for the preservation of its proper slopes, at the sides of such river, without the assistance of counter-shores to be made, and supported for its defence.

It is possible, that an objection may be made to the dimensions proposed for this cut, that it will not be capacious enough to convey to sea the waters from the countries above, at the times of great land floods descending from them : In answer to which, I only beg leave to state the dimensions of the present confined channel, in different parts of it, between *Denver* sluice and *Eau-Brink*, which are as follows :

From *Denver* sluice to *Downham* bridge, (being nearly one mile and three quarters in length,) I found a good channel in every part where it did not exceed one hundred and twenty-seven feet in width, and where it did exceed that width, it was deficient in depth, equal to what it had gained in width; and found *Downham* bridge to contain

contain about one hundred and twenty-four feet clear water-way in width, after deducting the space that the piles occupy, which support the said bridge.

From *Downham* bridge to *Stow* bridge, (being two miles and three quarters in length,) I found a good channel, where it did not exceed one hundred and forty-four feet in width, and equally deficient in depth, in proportion to what it doth exceed that number of feet in width, and found *Stow* bridge to contain about one hundred and thirty feet clear water-way in width, after deducting the space that the piles occupy at that bridge.

From *Stow* bridge to *Magdalen* bridge, (being three miles in length) I found a good channel, where it did not exceed one hundred and sixty feet in width, and also deficient in depth, in proportion to what it doth exceed that number of feet in width; and found *Magdalen* bridge, to contain about one hundred and thirty-two feet clear water-way in width, after deducting the space that the piles occupy at that bridge.

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From *Magdalen* bridge to *St. German's* bridge, (being nearly two miles) I found a good channel, where it did not exceed one hundred and eighty-one feet in width, and likewise deficient in depth, in proportion to what it doth exceed that number of feet in width; and found *St. German's* bridge to contain about one hundred and nine feet clear water-way in width, exclusive of the space that the piles occupy at that bridge.

From finding an increase in the width of the channel, as I advanced down the river; I am of opinion, that by the continuing a proportionable increase down to *Lynn*, that I have every reason to suppose, that it will be sufficient to discharge all reflowing currents, without impeding the descent of any waters in the least degree; for I am informed, that there never was the least obstruction given to the discharging of a land flood, when it had got down the river, as far *Magdalen* or *St. German's* bridges; I am therefore from these observations induced to propose, that the cut from *Eau-brink* downwards to the first cross bank, being about one mile, and three furlongs in length, should be



be made about two hundred and eight feet wide at the top, and from thence to the lower end of the said cut above *Lynn*, being about one mile and a half in length, should be made two hundred and forty feet wide at the top, with a slope of one foot and an half on each side of such cut, to every foot in perpendicular depth, and to make the said cut five feet deep at low water, those dimensions being a continuation of the proportionable increase, that the upper part of that channel hath at this time, where it is of a proper and sufficient depth.

To make it wider, than there is a probability that it will be able to maintain and keep itself open, when it is finished, and made use of, will be idly throwing away so much money as that will cost, and cannot answer any useful purpose whatever. I am of opinion, that the above dimensions will be quite sufficient to contain any, and every land flood that may have occasion to discharge its waters into the harbour of *Lynn*, and at the same time be of a sufficient space, to admit of a proper indraught for the tide of flood to flow up into the country, for every purpose of navigation and drainage.

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Though hinted at in a cursory way before; It may not be improper to repeat, the expence that will be saved to the country of *Marshland* above *Lynn*, (should the proposed new cut be carried into execution) by easing them of their present method of defending their lands from the incroachments of the sea, by their very expensive banks and counter shores, as in a little time after the finishing of this work, when the water being forced down the new cut, the present will very rapidly silt up, and become marsh, and consequently free them from any further expence, of maintaining such bank, and such counter shores.

I am of opinion, that it will be necessary to have a bridge built over such cut, for the better accommodation, of the proprietors and occupiers of the lands on each side of such cut. The situation of which bridge; not professing myself a sufficient judge of the country, so as to be able to fix on a precise place, wherein to build it; I would recommend such place being fixed on by such proprietors, and occupiers of land, as will be most materially affected by, or interested in its situation, and have only to remark, that  
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the expence of building such a bridge, will be nearly the same wherever it is built, on which occasion it may be built in such a situation as will be the most convenient for the country. I would recommend such bridge to be of dimensions equal to two hundred feet in the clear water-way, to consist of five eyes or openings, each of which should be equal to the admitting of three lighters abreast, through any of them, which may in that situation, be of more general utility, both for draining and navigation, than more contracted eyes may be.

At a meeting held at the Shire Hall at *Ely*, on Friday May the 20th. I was asked by the chairman, what was my opinion, respecting the rising of the tides at *Denver sluice* &c; should such a new cut be made; my answer at that time, was, that I was of opinion, that if such a cut should be carried into execution, that the tides would rise higher at *Denver sluice*, and at the adjacent sluices and rivers, but not materially so. My answer was at that time immediately given, to the question proposed, and that answer resulted from what then passed in my mind, on the general principles,



ples of the rise of tides in embanked rivers, I have since studied the question, taking in all the circumstances of the river, relative to which the question was proposed; but from all that I have heard; from what I can collect or have seen, either before or since that time, I have neither heard nor seen any thing, to cause me to alter the opinion, then given, which is the same now that it then was, viz. that the tides will rise higher at *Denver* sluice &c. but not materially so. Much danger is apprehended (or pretended to be so) on account of the tide of flood arriving sooner at *Denver* sluice, when the cut is made, than it doth at present.—Do not they who apprehend, or fear this consider, that by lowering of the surface of low-water in the hundred feet river four feet, that there will be an additional space, of four feet in depth, to fill every tide, and that the tide which rose on the 16th. instant at *Denver* sluice, five feet ten inches, would then have to flow nine feet ten inches, to get up to the same perpendicular mark at that sluice, and was I to take the fall of four feet nine inches to be gained, that tide must have flowed, ten feet seven inches, to have arrived at the same perpendicular mark at *Denver* sluice.

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But in order to illustrate, what in all probability will be the difference, in the flowing of the tides at *Denver* fluice at this time, and what it may hereafter flow there, if this cut is made. I attended to the flowing of the tides on the 16th. and 17th. instant, being the best of those spring tides, in several different parts of the river, by placing different persons, in such parts to attend to, and to minute down, the flowing and reflowing of such tides; and make such other observations, as I thought necessary.

From which observations, I found, that the tide on the 16th. instant that flowed eight feet at *St. German's* bridge, and was one hour and fifty minutes in flowing, flowed six feet five inches and an half at *Stow* bridge, and was one hour and forty-five minutes in flowing; flowed also at *Denver* fluice, five feet ten inches, and was one hour and forty-five minutes in flowing; and that the tide on the 17th. instant, that flowed six feet nine inches at *St. German's* bridge, and was one hour and fifty minutes in flowing, flowed five feet two inches at *Stow* bridge, and was one hour and forty-five minutes in flowing; flowed also

also at *Denver* sluice, four feet four inches and an half, and was one hour and forty-five minutes in flowing.—It may be proper here to account for the inequality of the flowings of the tides as to their heights in these two succeeding days, which was occasioned on the 16th. by the wind being on that day in favor of it, whereas on the 17th. the wind set against it, blowing a very fresh gale.

The difference of the tides flowing between *Stow* bridge and *Denver* sluice, on the 16th. Instant, was seven inches and an half; on the 17th. Instant, nine inches and an half, I will average them at nine inches. Now the difference of the distance gained by the new cut, being about three miles, and the distance between *Stow* bridge and *Denver* sluice, being about four miles and an half, there remains one mile and an half difference in distance, which must cause one third part of the nine inches to be taken off, which being three inches, and that deducted from nine inches, there remains six inches, and so much in all probability will the tides run higher, upon a common spring tide at that time, than they now do (and no more). This method



thod I have made use of to demonstrate the above, apprehending that it would be more clearly understood, in this manner, than by any other mode of demonstration.

Having before observed, that as the tide at a point in the river which is thirteen miles and an half from *Lynn* by the course of the river (and which point is nearly equidistant between *Downham* and *Stow* bridges,) there flows six inches higher than at *Denver* sluice, and which distance being shortened by the proposed cut two miles and three quarters; *Denver* sluice will then by the course of the river be only thirteen miles and an half from *Lynn*, it is therefore most probable that under these circumstances, the tides will not be raised at *Denver* sluice above six inches; the distance at that place from *Lynn* being thus made equal to the distance from *Lynn* of the aforesaid point between *Stow* and *Downham* bridges.

I am yet of opinion, that a very high tide will not have that effect, so as to cause an additional flow of water of six inches then, more than at this time. Because I cannot  
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suppose, that the impulse of the tide from the sea, particularly when attended with a strong gale of wind from the north west, can have an equal power in the new confined channel, to that which it now hath in the present wide and expanded channel, and must therefore fall short, of that additional flow of tide very considerably.

And now I may ask, whether the rise of six inches on a common spring tide, can be the cause of any material injury to the fens in general? Suppose on this account it should be found necessary to raise the lower part of the hundred feet bank, as far as *Welney* for instance, being six miles; that may be done out of the annual allotments, that the honourable corporation of *Bedford* level grant, at their *April* meeting, without increasing such allotments, or without any additional expence to any individual.

I may be asked by those who are adverse to the making this cut, what is to become of the wash bank on the north side of the hundred foot, and of the washes themselves? There are those who think that when the interests of the  
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middle and south levels are concerned, that such a tract of land as the hundred feet washes should not be put in any competition with them, that such washes were set apart and consigned as a reservoir, and in time of flood designed to hold the highland waters till they can get to sea, and thereby preserve the north bank of *Bedford*, and of the hundred foot, the great bulwarks of those two levels. Such sentiments however true they may be, I can not subscribe to; I trust that I know the value of that bank, and of those washes, better than to treat of them with so little regard. We have every year materials from those washes, for the support and maintenance of the old and the new *Bedford* banks, which materials, though some of them are not of the first quality for such purposes, yet providing substitutes in their room, would be found difficult, and expensive.

The support of the wash bank, I am an advocate for, and ever have been, and have only to lament, that it is not of greater dimensions, for were it of dimensions equal to withstand every tide that should rise against it, as also  
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of containing a small land flood, in my opinion, it would be of much more service to the country than it is at present, or ever yet hath been; That the hundred feet river hath improved of late years is well known, and that it would have been, in a much better state at this time, if it had been confined by a high wash bank, I make no kind of doubt of: my reasons for wishing that bank to be improved are many and obvious, and I should rejoice, in being any way instrumental in causing it to be put into a good state of security. The time of effecting this I hope is not far distant, to which I may add, that the benefit that river will receive, by having its low water mark reduced four feet, the certainty thereby of the floods being discharged from off such washes, (by the fall so gained) in a much less space of time than they now can possibly be discharged in, will naturally improve and increase in value such wash lands. and (similar from the same causes to the washes between the north and south banks of *Morton's leam*, benefited by the new cut below *Wisbeach*) they will from the great improvements they receive, rise in their rents, in due proportion with those so already raised.

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I have before mentioned, that the water by the making of the proposed new cut, would be lowered at the mouth of the Hundred feet river, at *Denver*, *Old Bedford* and *Salter's Load* sluices, four feet.

In addition to which, I now beg leave to say, that whatever fall may be gained, at the mouth of that river, or at those three different sluices, the same fall (if required) may be gained at the most distant parts of either of the middle or the south levels, but how far such a fall would be of any use in the draining of their different districts, as also whether by that fall, several tracts of land might not at times have a natural drainage, without the assistance of water engines, and what savings might be made in many places so as to counter-balance their proportionable expence of executing such works as are necessary for the proposed plan:—To give an opinion on these several matters, so self apparent in themselves, would appear as impertinent in me.—The advantages given to a water engine in the time of distress, or in high floods, by lowering its head of water only two feet, and the pressure and danger of these two feet taken off their banks,

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may be more generally known than I can pretend to describe, particularly to those, that are more universally acquainted with such engines. In the last winter floods, the losing of only two inches of water against several districts, was looked upon as auspicious, and was testified by visible signs of joy in the countenance of many worthy and industrious farmers, who were deeply interested in the preservation of such districts from drowning.

By the lowering of the water four feet at the mouth of the Hundred feet river, that river by the frequent traffick, up and down it, and the working of the spade machine therein as usual, would very soon reduce every part of the bottom of it, (except such parts as are very hard) to the same depth; and those hard shoals being but few in number, and of no great extent, would easily, and with little expence be then taken up by hand, which would render the navigation up that river, of easy access at all times; as by such improvements, every neap tide would be felt, and would allow the gangs navigating on that stream, to pass along without their waiting for the  
spring



spring tides, to set them at liberty, (which they are almost always forced to do in dry seasons) and such navigation being improved to *Earith* bridge, they would immediately fall into deep water, from which place I am informed, that a staunch water will at all times set them forward towards their respective destinations.

With respect to the drainage and navigation up the river *Ouse* towards *Cambridge*, though I have not received any instructions to take notice of it particularly, yet, as I am informed that some of the Merchants using that navigation, are desirous of having an opinion, as to the operation of the proposed cut thereon, the duty I owe so respectable a body of men, induces me give them all the satisfaction in my power. It is necessary to premise, that I have not taken any late survey, or view of it; but apprehend that I have so much of its state and condition in my memory, as to enable me to submit to the committee. If it should afterwards be found necessary, or expedient for the country above *Denver* sluice, for its better drainage, to avail itself of the four feet fall, which will

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be obtained at *Denver* sluice, for the purpose of assisting at times any of the districts on that or the three adjoining rivers, of *Stoke*, *Brandon*, and *Mildenhall*, by a natural drainage; that in such case, the navigation towards *Cambridge*, would be deficient in depth in certain places, soon after they had passed *Littleport* bridge, and that such obstruction would be found more frequent, the higher they advanced up that river. At the same time I am of opinion, the said river would be deepened by the traffick passing through it, and by aid of the spade machine, in addition thereto, so much deepened as to give a constant navigation up to *Ely*, or perhaps a few miles farther up that river; for by the lowering of low water four feet in that river, it must be observed, that every neap tide would be felt at *Ely*, the same as the spring tides are now; and consequently, that twice in every twenty-four hours there would be some addition of water, which would be collected from the descending waters of those four rivers, and the several different lodes that have a communication with such rivers; being held up at *Denver* sluice, by the shutting of those doors for the time of each tide's flowing, (the same as is now the case on spring tides) this would  
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give an additional depth of water for navigation, every twelve hours, if it should be wanted, (which I am of opinion would not be the case.) The shutting of the ebb doors at that sluice, is by several recommended to assist navigation upwards, which they certainly would do, but it would be at the expence of drainage, as at the height that they now are, they would obstruct all the districts above that sluice from draining, by natural means, as well as drown a considerable quantity of land, which is not imbanked; particularly that tract of land which lies between *Ely*, and *Littleport*, &c. In the spring of the year (or at any other time) when the districts shall be sufficiently drained, and their water engines laid by for the summer; ebb doors might be put down, or the present ones lowered (if worth the expence) to any medium that might be required, so as to hold up the water (while the dry weather continued) which doors might be so placed as to assist the different districts, by holding up their soak from falling too low, during such dry weather, so long as they require it; and such doors will give constant relief to navigation, by the penning up a head of water for their use, which would give them a lasting and uninterrupted navigation for  
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some miles above *Ely*. Upon the approach of wet weather, such doors should be opened, and continue open so long as it might be deemed expedient, by having a mark fixed for that purpose, to regulate the times of opening of those doors, as well as of the shutting of the same.

I have said that navigation may be assisted by the above method ( without affecting drainage in the least degree ) some miles above *Ely*; I cannot at present pretend to specify the exact number of miles above *Ely*, nor is it very material at this time; for let such place be at what distance above *Ely* it may, I will venture to affirm, that there cannot be a compleat navigation for gangs to pass and repass at all times, without the penning or raising up of a head of water, by a sluice, or some such method, in some one place on the river, so as to give them by that means, and by the deepening of the river a little in some few places, a depth of water sufficient to carry them into *Clayhithe* sluice. For should the river be deepened so much as to give them water sufficient to bring their gangs close to *Clayhithe*, how are they to get into that sluice, but by the assistance of a further sluice, or by the penning or raising up a head of water in some particular place  
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for that purpose. The above being compleated, I will not hesitate to declare, that the navigation up to *Clayhithe* fluice, might be made as perfect and as compleat as most of the Canal navigations in this kingdom; and the gangs would not then have occasion to wait in different parts of that river, on many different shoals, and for several days together, when they have a scanty head of water from above, in expectation of being set at liberty by the letting down of a head of water from *Clayhithe* fluice; at the same time that the spring tides may have raised the water in the lower part of that river, which is at this present time, and hath been for several years past to my own knowledge, what they have been compelled to submit to.

The drainage and navigation up the *Mildenhall* river, are in many respects similar to that up the river *Ouse*, and *Grant*; to make that river a constant and good navigation, it will be necessary to treat it in nearly a similar manner, that the navigators might at all times navigate up that stream with ease and expedition, and without unloading their cargoes in the manner they are obliged at present to do so very frequently, and with such loss to their respective owners, and employers.

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I am the more confident in what I have here asserted on these several matters, on account of having had frequent opportunities of seeing the effects that a new cut, (proposed also by the same Mr. KINDERLEY) the proposer of this, and which was carried into execution below the city of *Chester*, for the improvement of the navigation up to that city, as well as to drain the lands adjoining to such new cut, and where the channel formerly ran, as well as other lands which lay contiguous to the same.—Various were the opinions of the different land-owners, occupiers of lands, and navigators interested therein, at the time that such cut was at first proposed, there were parties zealous for, parties violently adverse to the execution of his proposal; the party for vehemently insisting on the good effects that would in all probability arise therefrom. Those who were adverse to it, with Mr. BADESLADE at their head, condemning the whole, as pertinaciously insisting, that not only the navigation would be lost, “but also that the low lands above *Chester*, adjacent “to the river *Dee*, the *Rhodee*, *Saltney* marsh, and the low “lands adjoining to it, would all be furrounded by the “freshes, and their own downfal waters and become Fens.”

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But to the disgrace of such false Prophets, and their Engineer, who must have prostituted his judgement, if he had any, to a time-serving purpose, be it known that no such mischiefs ever happened. The lands alluded to by *Badeslade* were, last summer when I saw them, and have been ever since they were inclosed, in a state of high cultivation; the occupiers of the very lowest of such lands, being under no apprehension of any such evils thus falsely predicted, ever happening to them; and in that part of the kingdom, they have the singular felicity of not knowing, unless by description from those who do, what a Fen is. The navigation also of that river, by such new cut, was so much improved, up to the city of *Chester*, that vessels of burthen are now frequently seen discharging their cargoes at the quay of that city, which formerly were brought up in smaller craft, on account of the want of a sufficient depth of water, for vessels of larger burthen.

The very short time, that hath passed between the finishing my view, and making my observations on the rivers &c. and this meeting, made it impossible for me to draw up this report in such a manner, that I could have wished

to have presented it in this place: I therefore must request, that whatever inaccuracies may occur in these pages, may be attributed to the want of time that was necessary for producing them, as to form and order, in a more finished state; I have scarcely had that time which was necessary to throw together, even in the precipitate manner they here appear, my thoughts on so many important and different subjects; much less have I had it to digest them in the manner they ought to have been digested, to be laid before this committee; desirous of imparting any knowledge that I may be possessed of on these matters, (and having been frequently pressed for the communicating of it,) that it might this day undergo the consideration of this committee, I here lay before them all the information the time allowed me, would permit me to give; and can only add, that I have been so pressed, that I found a difficulty, even to obtain the time that was necessary to transcribe this Report.

J A M E S G O L B O R N E.

E L Y, Aug. 30, 1791.

## AN ESTIMATE

Of the expence of conveying the waters of *Marshland*, into the proposed New Cut.

	£.	s.	d.
To cutting a new drain from <i>Marshland</i> or <i>Islington</i> drain, to nearly opposite St. Mary's Gool. - - - - -	587	5	0
To purchase of land. for ditto. - - - -	217	15	0
To a sluice to discharge the said waters. -	1000	0	0
To two bridges over the said drain, (made of old materials.) - - - - -	10	0	0
To deepening 643 rods of drain. - - - -	48	4	6
To 12 bridges to lands (made of old materials.)	24	0	0
To a sluice at the lower end. - - - - -	150	0	0
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	2037	4	6
Deduct for materials to dispose of. - - -	150	0	0
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	£.1887	4	6
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## AN ESTIMATE

Of the expence of cutting a New Cut from below  
St. German's bridge, near *Eau-Brink*, to about  
half a mile above *Lynn*.

	£.	s.	d.
To spade and barrow work, in executing the said cut, including materials for the workmen, pumping, &c. &c. - - - -	27343	2	0
To purchase of land for cut and cover. -	6025	0	0
To a dam over the present channel. - -	2000	0	0
To a bridge over the new cut. - - - -	1500	0	0
To two piers at the entrance of ditto. - -	500	0	0
To a sluice to discharge the waters from the lands cut off. - - - -	30	0	0
To superintendance. - - - - -	700	0	0
	£.38098	2	0

## ERRATA.

Page 9 line 4 for *extant* read *extent*, Page 22 line 7 for *one hundred and nine*  
read *one hundred and fifty nine*, page 22 line 17 *as far* read *as far as*, page  
29 line 7 for *two miles and three quarters* read *three miles*, page 30 line 18  
for *foot* read *feet*, page 31 line 7 for *foot* read *feet*.